

At aphelion in this orbit the comet would be distant from the orbit of Jupiter 0°503, but there is a very much closer approach to the orbit of Mars, at a true anomaly of 37° 13', corresponding to heliocentric longitude 343° 25', where the distance of the two orbits is only 0°0088, and it is worthy of note that between April 5 and 10, 1868, both Mars and the comet would pass that point, and if Dr. Berberich's period is approximately correct, there must have been a close approach of the two bodies, possibly a closer one than calculation assigns. The following positions are deduced from the elliptical orbit:—

| At Berlin, Midnight | | | |
|---------------------|----------|-----------|------------------------------|
| | R.A. | Decl. | Log. Distance from Earth. |
| October 5 | 20 33 51 | - 22 30 1 | 9°8331 |
| 9 | 20 46 54 | 21 2'5 | 9°8536 |
| 13 | 20 59 26 | 19 35 6 | 9°8746 |
| 17 | 21 11 28 | 18 10 0 | 9°8960 |
| 21 | 21 23 4 | 16 45 9 | 9°9175 |
| 25 | 21 34 14 | 15 23 5 | 9°9391 |
| 29 | 21 45 1 | - 14 2'9 | 9°9608 |

The comet is rapidly growing fainter, but it is obviously of importance for its theory that observations should be continued as long as possible.

COMET 1884 c.—A new comet was discovered by Herr Wolf at Heidelberg on September 17, and was observed at Strasburg on September 20. It was also independently detected by Dr. Copeland at Dun Echt on September 22, the night before the telegraphic notice from Kiel arrived at that Observatory. Prof. Tacchini has favoured us with the following observations made by himself and Prof. Millosevich at the Observatory of the Collegio Romano in Rome:—

| Rome M.T. | R.A. | Decl. |
|----------------------|-------------|-------------|
| h. m. s. | h. m. s. | h. m. s. |
| Sept. 21 ... 9 24 47 | 21 15 46'00 | + 9°59'22"6 |
| 23 ... 7 39 12 | 21 16 44'33 | + 21 7 48'7 |

This comet is likely to remain visible for several months, according to the orbits yet calculated, but a somewhat wider extent of observation than is now available will be required to predict its track in the heavens with any degree of certainty.

THE LUNAR ECLIPSE ON OCTOBER 4.—We gave last week the times of occultations of two stars during the totality of this eclipse, of which accurate positions are found in our catalogues. A somewhat extensive list of stars liable to occultation has been determined at Pulkowa with sufficient precision for the predictions of the times of immersion and emersion, which have been communicated to various observatories. Several stars rated higher than the ninth magnitude appear on this list, where the *Durchmusterung* magnitudes are followed. Our remark last week should have been explained as referring only to stars of which accurate places are found in the catalogues.

HYDROXYLAMINE AND THE ASSIMILATION OF NITROGEN BY PLANTS

THE researches of V. Meyer and E. Schulze on the action of hydroxylamine salts upon plants (*Berl. Ber.*, xvii. 1554) were undertaken with the *a priori* probability of showing that this base plays an important part in the synthetical activity of the plant; and although they have not succeeded in establishing the experimental fact, the results obtained are of great interest, and the whole is eminently suggestive of future possibilities. The supply of nitrogen to plants takes the form of nitrates and ammoniacal salts, and these classes of compounds being destitute of synthetical activity, we are driven to assume that the earlier stages of nitrogen assimilation consist in the conversion of these comparatively inert substances into derivatives having the "chemical tension" necessary to synthetic activity. Hydroxylamine and its salts, which occupy in point of oxidation a position intermediate between ammonia and the nitrates, are bodies possessing this character in the highest degree. To use the author's words, "the behaviour of this base towards the organic oxy-compounds is most aggressive: it is indeed astonishing with what facility it converts carbonyl-compounds into azotised derivatives." This is notably the case with the ketones and aldehydes of the fatty series, the products of the union being oximido-derivatives, *e.g.* aldoxime, acetoxime, isonitroso acids; in these the characteristic C=N₂ group easily undergoes reduction, with formation of the corresponding amido derivatives; and upon the hypothesis of the formation of hydroxylamine in the plant as the first stage in nitrogen assimilation, it is easy to see

in what manner its non-nitrogenous constituents, which for the most part possess the characteristics of aldehydes and ketones, would contribute to the further stages in its elaboration.

To test this hypothesis, in the first instance, the authors instituted parallel experiments on the culture of maize, to which the nitrogen was supplied in the form of ammonium sulphate, hydroxylamine sulphate, and hydrochlorate and potassium nitrate, respectively. The result was, in a word, to show that the hydroxylamine salts act as direct poisons to plant life, as indeed they have already been shown by Bertoni to act towards animal life. Having established this fact, the authors inferred their probable action as antiseptics, and experiment showed that they possess this property in a remarkable degree. This result, as they contend, does not negative the original hypothesis, as the occurrence of the base in the plant would necessarily be transitional.

It seems to us that the antiseptic properties of hydroxylamine are a direct consequence of its synthetical activity; and further that antiseptics fall into three classes according to their disturbance of one of the three essential conditions of cell life, which are: (1) hydration; (2) oxidation; (3) the synthetical activity of aldehydes (Löw and Bokorny), chiefly in the direction of condensation. In illustration of this classification we may cite as typical members of group (1) common salt, (2) sulphurous acid in its various combinations, (3) phenols.

THE BRITISH ASSOCIATION REPORTS

Second Report of the Committee, consisting of Prof. A. W. Williamson, Chairman, Prof. Sir H. E. Roscoe, Dewar, Franklin, Crum-Brown, Odling, and Armstrong, Messrs. A. Vernon-Harcourt, J. Millar Thomson, V. H. V. Veley, F. Japp, H. Forster Morley, and H. B. Dixon (Secretary), appointed for the purpose of drawing up a Statement of the Varieties of "Chemical Names" which have come into use, for indicating the causes which have led to their adoption, and for considering what can be done to bring about some Convergence of the Views on Chemical Nomenclature obtaining among English and Foreign Chemists.—The Report is somewhat lengthy, and includes some long tables of varieties of names for common chemical substances. It commences with historical notes on chemical nomenclature. No attempt was made until about 100 years ago to name chemical substances in a way which would indicate their composition; alchemistic or "culinary" names being given to substances in many cases. Macquer is credited with being the first to introduce generic names like vitriol and nitre to indicate sulphates and nitrates. The term salt was used to indicate almost any substance soluble in water and affecting the sense of taste, and in the eighteenth century acids, salts, and bases began to be distinguished. Rouelle was the first to define a salt from its chemical properties, and distinguish it from acids and bases (see Kopp's "History of Chemistry," iii.). Bergmann and Guyton de Mouveau separately proposed systems of nomenclature, many terms of which are still in use. De Mouveau made the terminations of names of acids uniform, and the names of salts to indicate their composition from bases and acids. In 1787 Lavoisier, De Mouveau, Berthollet, and Fourcroy prepared a scheme of naming compounds which is practically that in common use now, introducing the terminations "ate" and "ic," "ite" and "ous," in acids and salts. But higher and lower oxides are not distinguished by generic names. Berzelius made a more elaborate classification of salts, and added some names. He distinguished the halogen compounds of hydrogen as hydrides, and distinguished clearly between "neutral," "acid," and "basic" salts. The views now held of acids, salts, and bases are practically those of Gerhardt and Laurent, who first recognised the part played by hydrogen in acids and salts. The Report then goes on to consider the tables, which give the number of times a substance has been distinguished by any particular name. Table I. deals with the names of oxides of carbon from 1755 to 1882. By far the greater number of sources give the names carbonic oxide to CO and carbonic acid to CO₂; systematic names like carbonous oxide and carbonic oxide only occurring two or three times, the terms carbonic oxide and carbonic anhydride or dioxide being next in frequency. In France and Germany the names oxide de carbon and acide carbonique, Kohlenoxyd and Kohlensäure have been much more frequently used. But in several instances the same names have been used in a different sense; the term carbonic oxide being some-

times used for CO_2 , sometimes for CO . In Table II. the prominence of this "diversity of names for the one thing," and giving the same name to distinct substances, is more frequent. The use of numerical prefixes has also been very irregular; "thus, trisodic phosphate has been called 'triphosphate of soda,' 'diphosphate of soda,' and 'sesquiphosphate of soda'; in all these cases the prefix is intended to indicate the number of molecules of soda to one molecule of phosphoric acid." "In some of the older forms of nomenclature ambiguity was avoided by using the prefix 'bi-' to multiply the acid when in excess over the base, and 'di-' to multiply the base when in excess over the acid; thus, $\text{Na}_2\text{O}_2\text{SiO}_2$, bisilicate of soda, $2\text{Na}_2\text{OSiO}_2$, disilicate of soda." The Report goes on to say that "the usefulness of any system of nomenclature depends on its permanence." Curiously enough the tables show that where names have been adopted supposed to represent in some way the chemical constitution of bodies, they have not, as a rule, endured; the advance of knowledge necessitating a change of opinion, whilst names not expressing a chemical opinion as to constitution have endured. "As a rule, those names are to be preferred which have shown most vitality and have led to no ambiguity. Where there are two compounds composed of the same elements, the termination 'ous' and 'ic' should be employed. The prefixes 'proto' and 'deuto,' introduced by Thomas Thomson, were intended to mark the compounds in a series, not the number of atoms in a molecule. Where retained this use only should be made of them." Referring to change of name, instance is made of the oxides of carbon, the names of which have recently to some extent been transposed, the higher one being termed "carbonic oxide," and the lower one, to which the term "carbonic oxide" has long been applied, has had a new name. The sensible conclusion of the Report is to retain names of substances which are in common use, rather than to change them for names indicating constitution, and which might be again found to require alteration in accordance with some new view of the constitution of the substance.

SECTION B—CHEMISTRY

AT the meeting of the Chemical Section at Montreal a new departure was made in the selection by the Organising Committee of two subjects for special discussion. The subjects chosen were: "The Constitution of the Elements," and "Chemical Changes in their Relation to Micro-Organisms."

Discussion on "The Constitution of the Elements"

Prof. Dewar began by referring to Grove's discovery that water suffered decomposition at the temperature of the oxy-hydrogen flame, an experiment which led Sainte-Claire Deville to undertake his researches on dissociation. Deville has shown that in compound substances there is an equilibrium between decomposition and recombination, this balanced relation changing with the temperature. The experiments of Deville on the temperature of burning gases agree closely with the results obtained by Bunsen, who determined the pressures generated in the explosion of hydrogen and other gases with oxygen. The breaking up of the iodine molecule, effected by Victor Meyer, is a decomposition of elementary matter. Owing to the rapid recombination, there seems no hope of isolating atomic iodine at low temperatures. The vapours of potassium and sodium have different densities at different temperatures; probably also their molecules consist of two atoms at lower, and of one atom at higher, temperatures. More exact determinations are needed of those substances which exhibit a variable vapour density. The evidence afforded by spectral analysis proves that oxygen and nitrogen have two spectra, and therefore probably different molecules at different temperatures. Hydrogen has a complicated spectrum under certain conditions. Referring to Mr. Lockyer's speculations, he said there was a general basis of similarity in the type of the vibrations of certain allied elements, *viz.* the triple lines in zinc and cadmium. Mr. Lockyer has proved that the identity of certain "basic" lines of different elements, such as iron and calcium, is not due to impurity, but the greater dispersion of more powerful instruments has shown that the coincidence of these lines is only apparent and not absolute. The differences observed in some of the spectral lines of a single element in the sun might be accounted for not by the decomposition of the "element" into simpler matter but by great differences of level in the luminous vapour. Prout's hypothesis, that the atomic weights of the other elements are

multiples of that of hydrogen, has no basis in experimental fact. Stas and Marignac have both returned in their old age to the redetermination of the atomic weights made by them twenty years ago. Stas, avoiding the possible sources of error in his former methods, has lately found 14.055 for the atomic weight of nitrogen; his old determinations gave 14.044. For potassium he now arrives at the number 39.142 instead of 39.137. Marignac gives the following as the atomic weights of zinc and magnesium, 65.33 and 24.37,—numbers very far removed from whole numbers.

Prof. Wolcott Gibbs drew the attention of the Section to the probability that what is generally regarded as a simple molecule, such as sodium chloride, consists in the solid state of several hundreds of atoms, and that the salt undergoes in solution a kind of molecular dissociation. Very complex molecules, such as those acids he had prepared containing many molecules of the oxides of molybdenum, vanadium, barium, &c., are probably derived by substitution from what are called simple molecules, but which are really composed of a great number of atoms.

Prof. Frankland said he ventured to differ from Prof. Dewar in one point. He thought it might not be impossible by a decomposition of compound molecules to prepare isolated iodine atoms.

Sir Lyon Playfair suggested as a useful line of work the determination of the conditions under which such bodies as nitric peroxide would enter into combination with other compounds.

Prof. Tildén pointed out that a large field lay open to workers in thermo-chemistry, on the one hand in determining the temperatures at which chemical action begins, and on the other the heat-changes of chemical combination and solution at different temperatures.

Rev. Father Perry agreed with Prof. Dewar that some differences in the solar lines were due to difference of level of the luminous vapour. But, on the other hand, the widening of solar lines in the umbra of spots cannot be accounted for in this way. The Astronomer-Royal and Mr. Lockyer have been studying the solar spectrum from the line D to F. The Rev. Father Perry (studying D towards B) has found differences in the lines of the same metal in different spots which could not be attributed to difference of level only.

Prof. Dewar, in answer to Father Perry, stated that the widening of certain lines at the red end of the spectrum might have been anticipated from the results of his own work in the crucible. The supposed allotropic spectrum of magnesium is due to a compound of magnesium and hydrogen. The fact that in the upper regions of the solar atmosphere, where hydrogen and magnesium occur in enormous quantities, this allotropic spectrum is not observed presents a difficulty. Perhaps at the mean temperature of the solar atmosphere this compound is dissociated. If so, somewhere nearer the surface or in the spots a condition of temperature should occur in which the compound should be stable. He hoped Father Perry would succeed in observing this spectrum in the umbra of spots. It had been stated that if our elements are compound substances they should be found decomposed at the enormously high temperatures of the sun; but if it is admitted that the elements are compounded of hydrogen, and that dissociation can occur, the compound vapour is diffused through an atmosphere of hydrogen, one of the products of its dissociation, and is therefore precisely under those conditions in which it is most stable.

Discussion on "Chemical Changes in their Relation to Micro-Organisms"

Prof. Frankland, in opening the discussion, distinguished between two kinds of chemical action—(1) that in which substances brought into contact mutually undergo chemical change, and (2) that in which chemical change is effected in one substance by contact with another, which itself apparently suffers no alteration. The following definitions were proposed to distinguish animal and vegetable organisms:—(1) A plant is an organism performing synthetical functions, or one in which these functions greatly predominate; it transforms actual into potential energy. (2) An animal is an organism performing analytical functions, or one in which these functions greatly predominate; it transforms potential into actual energy. All micro-organisms appear to belong to the second class. Oxidation is the essential condition of life. There are, however, many other chemical transformations in which potential becomes actual energy, and which therefore can support life. After de-